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Simulation of Beam Dynamics for MEMS Devices

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Microelectromechanical Systems (MEMS) are systems made up of small components to complete a bigger goal. Some of these components can be modeled as small beams, which are anchored at both sides, or as cantilever beams. These beams can be subjected to various forces such as Knudsen Forces, Electrostatic Forces as well as G-loading. These devices have many applications such as sensors, actuators and even as accelerometers for airbags, smart phones and game controllers. Modeling the dynamics of these beams is an important task for the MEMS community, consisting of researchers, fabricators, and designers working on one of the many applications of MEMS, and they will benefit from having a tool that can model this. These beam dynamics were simulated on naohub.org by using the RAPPTURE tool, created by Michael Mclennan et. al. to help create graphical user interfaces with different codes to perform analyses, in order to design the graphical user interface for the modeling program. This tool uses a nondimensional, explicit solver to analyze the dynamics of the beams. The results of this are a tool that has been incorporated onto nanoHub.org that is able to simulate the dynamics of microbeams that are subjected to one of many forces. This tool is able to simulate the dynamics of cantilever microbeams with acceleration, electrostatic and Knudsen Forces acting on it, and some more work needs to be done in order to include the effects of these forces on microbeams that are anchored at both sides.